SPRINKLER SHOP DRAWINGS
2002 NFPA 13, 2002 NFPA 24, and 2006 IBC

Listed items require sprinkler system shop drawing revisions and manufacturer product cut sheets verifying listing by a nationally recognized testing laboratory. *Answers in letter form are not acceptable*. **Starting construction before plans approval may be considered as just cause, by the State, to issue a stop work order. [Rule 0780-2-3-.03(2)]**

Submittal Requirements

1. Provide the following: Two sets of shop drawings with the responsible managing employee's signature and number, one copy of hydraulic calculations for each design demand area, one copy of manufacturer's cut sheets verifying fire protection listings for underground and above-ground piping, fittings, valves, devices, sprinkler heads, hangers, etc.

2. The automatic sprinkler system shop drawings must be reviewed and approved by the fire protection engineer of record processed with the engineer's shop drawing review stamp prior to the submittal to the State Fire Marshal's Office.

Underground

1. Provide a complete site plan showing the following per NFPA 13 Chapter 10 and NFPA 24 Chapter 10.

    A. Identify the location and size of the city main at the sprinkler system tap. Show the location of the domestic water tap. Work from the Point of Service must be performed by a registered sprinkler contractor. Show the point at which your contract begins. If your work is above-ground only, approval will be postponed until the underground shop drawings are submitted and approved. [Rule 0780-2-7-.08]
    B. Provide details of the underground piping from the city main to the building identifying: line size (6" min., unless the requirements of NFPA 13 15.1.3.2 are met), depth of bury (3 ft. min.), sectional valve locations, valve pit, thrust block size and location, and pipe trench detail. [NFPA 24 Chapters 4 &10 and NFPA 13 Chapter 10]
    C. Provide a cross section of the valve pit. See NFPA 13 Figure A8.16.2 (b).
    D. Identify whether a reduced pressure backflow preventer or meter are present.
    E. The fire department connection must be on the street side of the building and be located and arranged so that hose can be attached without interference from any objects, fences, posts, buildings, etc. [NFPA 24 5.9.5.2 and NFPA 13 8.16.2.4.6]
    F. The pumper hydrant must be within 100 feet of the fire department connection.
    G. Show the location of the fire pump and/or tank and if needed, the backup power source. Additional information must be provided - see the attached Fire Pump or Tank Shop Drawing check list. [NFPA 13 15.2, NFPA 24 5.6, and 5.7]

2. A post indicator valve is required for supply lines. [NFPA 24 6.3.1] The PIV must be electronically supervised and should be located not less than 40 feet from the building. [2006 IBC 903.4 and NFPA 13 8.15.1.1.2.1]

3. Provide tamper switches at all valves in the site underground pit. [NFPA 13 8.15.1.1.2 and 2006 IBC 903.4]

4. Service mains must not run under building(s) unless special precautions are taken (i.e., arched foundation walls, covered trenching, and isolation valves.) Provide details. [NFPA 24 10.6 and NFPA 13 10.6.2]

5. Provide a lead-in detail where the underground piping passes through the foundation and attaches to the riser. Provide clearance to prevent breakage of the piping due to building settlement. [NFPA 13.15.1.6.1 and .2] Provide a method for drainage where the lead-in terminates at a point lower than grade. [NFPA 13 8.15.2]

Above-Ground

1. Label each room of the building (classroom, storage, janitor's closet, etc.). Label all covered porches, balconies, covered walkways, and loading docks.

2. Provide a system riser schematic with control and check valves, flow switches, tamper switches, local waterflow alarm, etc. [NFPA 13 Chapters 7 & 8 and Figure A 8.15.1.1]

3. Provide a local waterflow alarm. [NFPA 13 6.9.3]

4. Show that the system is supervised per NFPA 13 8.15.1.1.2 (1 and 2 only) and 2006 IBC 903.4:

   A. Provide tamper switches at all control valves.
   B. Provide a flow switch or alarm check valve and specify connection to the general building alarm (must sound within 5 minutes of flow). [NFPA 13 6.9.1]
   C. For high-rise buildings, the requirements of NFPA 13 8.16.1.6 must be met.

5. Supply a spare assortment of sprinkler heads with a wrench. [NFPA 13 6.2.9]

6. The fire department connection must be an approved NH standard, internal threaded swivel fitting, with listed plugs or caps. [NFPA 13 6.8]

7. The maximum area limitation for the provided number of risers is exceeded. The maximum area is: light or ordinary hazard - 52,000 sq. ft. per riser; extra hazard - 40,000 sq. ft. per riser or 25,000 for pipe schedule systems. [NFPA 13 8.2]

8. The entire building must be sprinklered. Identify all areas to be sprinklered.

   A. Elevator shafts must be sprinklered at the bottom of the shaft with sidewall sprinklers not more than 2 feet above the floor of the pit. [NFPA 13 8.14.5.1] These heads must have ordinary or intermediate temperature ratings. [NFPA 13 8.14.5.3]
   B. Provide sprinkler protection under an accessible first landing of a noncombustible stair and at the top of the stair shaft. [NFPA 13 8.14.3.2.1]
   C. Provide coverage at vertical shafts (HVAC, plumbing, electrical chases) that are non-combustible but accessible. [NFPA 13 8.14.2]
   D. Provide sprinklers under all combustible ground floors, exterior docks, and platforms. See reference for exceptions. [NFPA 13 5.14.6]
   E. Provide sprinklers under exterior roofs or canopies exceeding 4 ft. in width that are not used for storage (i.e. loading docks). See reference for exceptions. [NFPA 13 8.14.7]
   F. Provide sprinklers in every aisle and tier for library stack rooms. See reference for exceptions. [NFPA 13 8.14.9]

G. Provide sprinklers for electrical equipment rooms. See reference for exceptions. [NFPA 13 8.14.10]

H. Provide sprinklers at stages, under stages when combustible construction or used for storage and at all adjacent stage areas. [NFPA 13 8.14.15.1] Where proscenium opening protection is required provide a deluge system with open heads no more than 3 ft from the stage side of the opening, and at a maximum of 6 ft. on center. [NFPA 13 8.14.15.2]

9. Identify the sprinkler types with a legend. Provide the manufacturer, model, discharge (upright, pendent, sidewall, etc.), response (standard or quick), coverage (standard or extended), orifice size, K factor, and the operating temperature.

10. Standard coverage sprinklers must be located per the charts given on Tables 8.6.2.2.1(a), (b), (c), and (d).

11. Extended coverage sprinklers (upright, and pendent) must be installed per their listing. Provide the listing information and identify the coverage used. The proper K Factor must be used in the hydraulic calculations.

12. The maximum coverage for any head is 400 ft^2. [NFPA 13 8.5.2.2.2]

13. The minimum spacing for sprinkler heads is 6 feet unless the requirements of 8.6.3.4.2, .3, or .4 are met. [NFPA 13 8.6.3.4.1]

14. Sprinklers in light hazard occupancies must be one of the four types listed in NFPA 13 8.3.3.1.

15. Sidewall sprinklers may only be installed for light hazard where the ceiling is smooth and horizontal or sloped and flat. Maximum coverage for standard light hazard side wall sprinkler heads is 196 sf. Ordinary hazard occupancies must have smooth, flat ceilings and a head specifically listed for this use. [NFPA 13 8.4.2]

16. Provide a building cross section with sprinkler heads showing clearances and distances from beams, ducts, structural members, etc. Distances from obstructions must be as specified for the type of sprinkler head in NFPA 13 Chapter 8.

17. Where branch lines run near roof structural members, provide a cross section view showing that sprinkler head locations comply with the 5.2.1.3 section of NFPA 13 Chapter 8.6 through 8.12.

18. Standard and extended coverage pendant and upright heads must be located between 1 to 12 inches from the ceiling. [NFPA 13 8.6.4.1.1 and 8.8.4.1.1] Standard and extended coverage sidewall heads must be located between 4 to 6 inches from the ceiling. [NFPA 13 8.7.4.1.1 and 8.9.4.1.1]

19. Where a water curtain is used to protect glass walls and inoperable windows, specific application window sprinklers must be used. Provide cut sheets for the product to verify that the listing requirements are met. Unless otherwise listed: 1) The system must be a wet system for interior use or a deluge system for exterior use; 2) heads spacing is a maximum of 6 ft. on center or within each mullion glazing segment. [Office Policy and 2006 NFPA 101 8.6.7(1)(c)]

20. Provide an inspector's test pipe per NFPA 13 8.16.4.2.

21. Show the location and type of hanger systems used. [NFPA 13 Chapter 9]

22. Provide earthquake protection sway bracing at locations specified by NFPA 13 9.3.5. Provide straps for C-clamps used to attach hangers to the building structure. [NFPA 13 9.3.7] Secure the top of the riser with a 4-way sway brace. [See NFPA 13 9.3.5.5.1] Show type and location of branch line restraints. [NFPA 13 9.3.6] Alternative methods are permitted based on a seismic analysis by a registered engineer. [NFPA 13 9.3.1.2] Show pipe sleeve size and location for required clearance around sprinkler piping passing through floors, walls, and foundations (concrete floors/walls or CMU walls). [NFPA 13 9.3.4]

23. Provide flexible couplings at flexure joints and, where required, provide clearance around piping passing through floors, walls, and foundations. [NFPA 13 9.3.2.1 and 9.3.4]

24. The entire system must be drainable. Sprinkler feed pipes must be pitched for drainage (i.e., trapped piping, dry pipe systems, low points, etc.). [NFPA 13 8.15.2.2] Provide auxiliary drains for trapped piping. [NFPA 13 8.15.2.5] All drains must discharge outside or to a drain connection. [NFPA 13 8.15.2.4.4]

25. The following information must be provided for dry pipe systems.

    A. Provide the capacity of the dry sprinkler system. A maximum capacity of 750 gallon per riser is permitted, see the reference for exceptions. Provide the individual capacities of both systems when connecting to an existing dry system. [NFPA 13 7.2.3]
    B. Provide a quick opening device for dry sprinkler systems with capacities over 500 gallons per riser. [NFPA 13 7.2.4.1] A check valve must be installed between the quick opening device and the dry valve. [NFPA 13 7.2.4.6]
    C. Gridded systems are not allowed for dry systems. [NFPA 13 7.2.3.5]
    D. Combined dry pipe and preaction systems must be equipped with a listed quick opening device at the dry pipe valve. [NFPA 13 7.4.2.8]
    E. Show the air filling connection, compressor, control, check, and relief valves, etc. [NFPA 13 7.2.6.1] Furnish specifications for the compressor. Identify whether it will be operated automatically or manually. [NFPA 13 7.2.6.6 and .7]
    F. Sprinkler heads installed on dry pipe systems must be one of the four types listed in NFPA 13 7.2.2.

26. The proposed sprinkler system solenoid valve used for elevator hoistways and machine rooms would have to be tested and listed for this particular application and be supervised by the fire alarm system to satisfy the code. [NFPA 13 6.1.1 and 8.15.1.1.2] The use of a stand alone solenoid valve serving a dry system branch line for elevator hoistways and machine rooms is not an acceptable alternative to a preaction sprinkler system.

Calculations

1. Verify the occupancy classification related to sprinkler installation and their water supply: light hazard; ordinary hazard (Group 1 and 2); extra hazard (Group 1 and 2); and special occupancy hazard. [NFPA 13 5.1 through 5.4]

2. Sprinklers in concealed spaces having no access for storage (unused attics) or other use must be installed in accordance with the requirements of light hazard occupancies, otherwise ordinary hazard. [NFPA 13 8.14.1.3]

3. Laboratories using chemicals must be ordinary hazard Group 1 or 2. [NFPA 13 8.1]

4. Commercial kitchens must be protected to ordinary hazard Group 1 requirements. [NFPA 13 5.3.1]

5. Large stack rooms in libraries must be protected to ordinary hazard Group 2 requirements. [NFPA 13 5.3.2]

6. Stage area must be protected to ordinary hazard Group 2 requirements. [NFPA 13 5.3.2]

7. The water supply for sprinklers only (hydraulic calculation methods) must be determined either from the area/density curves of Figure 11.2.3.1.5 in accordance with the method of 11.2.3.2 or be based upon the room design method in accordance with 11.2.3.3. [NFPA 13 11.2.3]

8. Provide 1-copy of hydraulic calculations referenced from a test hydrant adding the hose stream demand to the water supply for sprinklers. [NFPA 13 11.2.3 and Table 11.2.3.1.1]

9. Provide or clarify any necessary hydraulic reference points on the drawings.

10. The system area of operation must be increased by 30 percent without raising density for dry and double interlock preaction systems. [NFPA 13 11.2.3.2.5]

11. For wet systems with sloped ceilings see NFPA 13 11.2.3.2.4.

12. For atrium and/or glass wall sprinkler requirements see the Sprinkler Design Intent correction list information.

13. Provide a pressure reducing valve where the potential exists for water pressures exceeding 175 psi. [NFPA 13 8.15.1.2]

14. A minimum of two additional sets of calculations must be submitted to demonstrate peaking of the demand area for gridded systems. A single set of calculations may be submitted where a computer program is used. [NFPA 13 14.4.4.2]